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DD/ST-1157-63

14 August 1963

MEMORANDUM FOR: Director of Central Intelligence

SUBJECT : Telstar II

1. This memorandum is for your information only and amplifies oral information given by the undersigned at today's morning staff meeting.

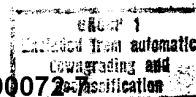
2. While the disruption in the operation of Telstar II remains as yet unexplained, there appears to be almost no likelihood that it was the result of Soviet attempts to tamper electronically with the satellite. It appears possible that the satellite might have accepted a spurious command, but this would not adequately account for its performance since contact was lost on 16 July 1963. This conclusion is concurred in by both NASA and Bellcom Telstar project engineers.

3. Telstar II stopped functioning during its orbital pass between Johannesburg, South Africa and Woomera, Australia, on 16 July. While in contact with the Johannesburg station, it was functioning perfectly. Attempts to contact it by Woomera were totally unsuccessful, and though later repeated attempts to contact the satellite were made, none was successful until it was reactivated by a routine command on 12 August.

4. The acceptance of spurious commands by the satellite appears to have been possible. No sophisticated command coding is used so that "any reasonably well equipped electronics laboratory" might have had the capability of affecting the system. Evidences of spurious commands were almost certainly observed in the operation of Relay, a NASA communications satellite, and were found to be the result of coincidental interference from ground stations operating in the 12 Mc/s range in North America. In addition, anomalous command verification was observed at times with Telstar I. In these instances, a command was given the satellite which decoded it and verified its receipt and operation in the commanded mode. No further commands were given prior to its passage beyond the local electronic horizon, but upon interrogation by a later station, the satellite would prove to be operating in another mode as though

NASA(s) review(s) completed.

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a subsequent command had been given. It is possible that these phenomena were the result of spurious commands though other explanations also exist. Under any circumstances, these events did not seriously impair the operation of either satellite.

5. Since the Telstar satellites are development vehicles, the licensing agreement under which they are launched requires that a positive turn-off command be included in the system. It appears possible, then, that the system could be shut-down by an unprogrammed command. Such a shut-down would not be irrevocable, however, and the system could be reactivated by another command since Telstar design calls for a doubly redundant command receiver to be active at all times.

6. The sudden failure of Telstar II made diagnosis of the courses particularly difficult and until its reactivation, it was thought the malfunction was the result of a meteoroid impact. To some extent, a change in the spin axis orientation and spin rate observed in the optical data based on observations of the satellite's mirror system after its apparent demise supported this hypothesis. With its successful reactivation, however, the contention no longer appears valid and the change in spin parameters cannot be explained.

7. After the loss of contact, it was first thought that the system had indeed been shut-down by some sort of spurious command and later attempts to contact the satellite included reactivation commands that would have been effective had this been the case. Whatever the cause of the malfunction, it appears to have been more complex than the acceptance of an unanticipated command, however, as no command exists which could effect the type of interrupted operation actually observed. A number of technically possible explanations exist, but it has not been possible as yet to isolate the most probable cause of failure with a high degree of confidence. Attempts to do this are continuing with the help of telemetry from the reactivated satellite.

ALBERT D. WHEELON  
Deputy Director  
(Science and Technology)

OSI/BMSD [redacted] (14 August 1963)

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